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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/743,528	03/29/2001	Ib Dybkjaer	07089.0010U1	4036

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EXAMINER

RIDLEY, BASIA ANNA

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 07/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/743,528

Applicant(s)

DYBKJAER ET AL.

Examiner

Basia Ridley

BR

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2005 and 27 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4 is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dybjær (“Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes”) in view of Igarashi et al. (USP 5,167,865).

Regarding claim 1-2 and 5, Dybjær, in Fig. 13, discloses a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps:

- passing a process gas of hydrocarbon feedstock (“Natural Gas Feed”) through a first reactor (“Prereformer”), having an inner wall and an outer wall, with steam reforming catalyst in a heat conducting relationship with a hot gas stream of flue gas (see Fig. 13; page 98, Section 4; and page 99, Section 5);
- passing effluent from the first reactor to a subsequent tubular reactor (“Primary Reformer”) comprising at least one reforming tube having an inner wall and an outer wall and being provided with a steam reforming catalyst and wherein the at least one reformer tube is heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas (see Fig. 13, page 98, Section 4 and pages 88-89, Section 3.1);
- passing the effluent from the second reactor to an autothermal reformer (“Secondary Reformer”; see Fig. 13, pages 100-102, Section 6.1); and
- withdrawing from the autothermal reformer a hot gas stream of product gas rich in hydrogen and carbon monoxide (Fig. 13 and page 101, lines 18-20);

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- wherein the steam reforming catalyst comprises nickel and/or noble metal (page 86, Section 2 and page 91, Section 3.2);
- wherein the tubular reactor ("Primary Reformer") comprises a plurality of reformer tubes (P97, Section 4).

Dybjkær discloses that the first and second reactors can comprise either a tubular reactor (page 97, section 3.6), heat exchange reactor (page 97-98, section 4) and/or a fixed bed reactor (page 99-100, section 5). Further, the reference discloses that it is desired to improve thermal conductivity and efficiency of reactors used in disclosed process (page 92, lines 15-33), but the reference does not disclose said reactors having a thin film of steam reforming catalyst supported on walls of the reactors.

Igarashi et al. teaches an improved process for making of hydrogen and carbon monoxide rich gas by steam reforming wherein the process is carried out in a reactor having a thin film of steam reforming catalyst supported on internal walls of the reactor tubes (column 1-2). The process offers improved thermal conductivity and compactness over packed bed reactors or stacked monolith reactors (column 1-2).

It would have been obvious to one having ordinary skill in the art at the time of the invention to replace the catalyst filled tubes or packed catalyst bed of the first and second reactors of Dybjkær with the reactor having a thin film of steam reforming catalyst supported on walls of the reactor, as taught by Igarashi et al., for the purpose of improving thermal conductivity and compactness of said reactor.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dybjkær ("Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes") in view of Igarashi et al. (USP 5,167,865), as applied to claim 1 above, and further in view of

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Autenrieth et al. (USP 6,086,839)

Regarding claim 3, Dybjkær in view of Igarashi et al. disclose all of the claim limitations as set forth above, but the references do not disclose the process wherein the process gas passed through the first reactor is effluent from an adiabatic prereformer.

With regard to claim 3, modification of the first reactor of Dybjkær in view of Igarashi et al. to include more than one stage, wherein the process gas entering the second stage is an effluent from the first stage, would have been obvious to an ordinary artisan at the time of the invention, since systems using more than one performing stage in a reforming process was known in the art at the time of the invention, as evidenced by Autenrieth et al. (C4/L42-45). Mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 124 USPQ 378, 380 (CCPA 1960). Further, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Allowable Subject Matter

5. Claim 4 is allowed.

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6. The following is a statement of reasons for the indication of allowable subject matter: the claim combination wherein the first reactor is a preheater coil is allowable over the prior art of record, because one of ordinary skill in the art would not be motivated to design a prereformer having a coiled reactor tubes.

Response to Arguments

7. Applicant's arguments filed on 6 April 2005 have been fully considered but they are not persuasive.

8. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In the instant case, the suggestion to combine the references in a manner suggested by examiner can be found in the references themselves. Dybjær discloses a process for preparation of hydrogen and carbon monoxide rich gas, in the first and second reactors which, among others, can comprise a fixed bed reactor (page 99-100, section 5). Further the reference discloses that it is desired to improve thermal conductivity and efficiency of reactors used in disclosed process (page 92, lines 15-33). Igarashi et al. teaches an improved process for making of hydrogen and carbon monoxide rich gas in a reactor having a thin film of steam reforming catalyst supported on walls of the reactor (abstract). The process offers improved thermal conductivity and compactness over packed bed reactors or stacked monolith reactors (column 1-2). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to replace the catalyst

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filled tubes or packed catalyst bed of the first and second reactors of Dybjkær with the reactor having a thin film of steam reforming catalyst supported on walls of the reactor, as taught by Igarashi et al., for the purpose of improving thermal conductivity and compactness of said reactor.

9. Applicant argues that Dybjkær fails to teach using a hot gas stream of flue gas from a tubular reactor to provide heat to another reactor in the process. This is not found persuasive. In Fig. 13 Dybjkær shows a subsequent tubular reactor ("Primary Reformer") which uses a flue gas to provide heat to the subsequent tubular reactor. The same flue gas is used to preheat the feed to the first reactor, therefore Dybjkær teaches the first reactor being in a heat conducting relationship with a hot gas stream of flue gas, wherein said hot gas stream of flue gas is generated by burning fuel to heat the subsequent tubular reactor.

10. The applicant argues that Igarashi et al. does not disclose the thin film of catalyst on the inner surface of the reformer tube. This is not found persuasive, as Igarashi et al. in columns 1-2 discloses an improved process for making of hydrogen and carbon monoxide rich gas by steam reforming wherein the process is carried out in a reactor having a thin film of steam reforming catalyst supported on internal walls of the reactor tubes. The process offers improved thermal conductivity and compactness over packed bed reactors or stacked monolith reactors.

11. Regarding applicant's arguments that Igarashi et al. does not disclose circulating the heating medium, the examiner notes that Igarashi et al. has not been relied upon disclosing circulating the heating medium. The examiner has, however, relied upon disclosure of Dybjkær to disclose the first reactor being in a heat conducting relationship with a hot gas stream of flue gas, wherein said hot gas stream of flue gas is generated by burning fuel to heat the subsequent tubular reactor, as recited in rejected claims and as set forth above.

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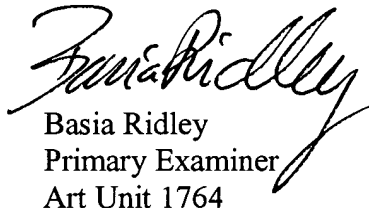
Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Basia Ridley, whose telephone number is (571) 272-1453.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola, can be reached on (571) 272-1444.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Technical Center 1700 General Information Telephone No. is (571) 272-1700. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Questions on access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).


Basia Ridley
Primary Examiner
Art Unit 1764

BR

June 27, 2005